

## IS ALCOHOL AN ALIMENTARY ARTICLE?

THAT there is still great need of general and accurate teaching in regard to this question, is evident from the fact, that while genuine authorities in physiology have long since answered in the negative, many pretenders to Science in the provinces, regularly retail in local papers the most exploded notions as to the dietetic value of alcoholics. One recent example shall suffice. In an Ayrshire paper, a writer alleges (on the ground of a *Chemical* table giving the 'units of heat' \* supposed to result from the *artificial* and *complete* combustion of the dried elements of certain substances), that Beer contains half the calorific power of Beef useable in muscular exertion ! The nature of this statement will be appreciated when we remind the reader, that while the Beef is almost entirely burnt up *within the living body*, the alcohol, the gummy matter, and the hop extract of Beer, are as surely eliminated unchanged by the excreting organs ; whence it follows that they cannot possibly yield a single unit of heat to the blood. † Everybody must see that, as the coals and chips that *fall out* of the grate, are not the fuel that actually boils the kettle, so a substance like alcohol, which is constantly *cast out* of the bodily furnace, cannot contribute to the warming of the living house. Nothing can exceed the folly of the comparison of artificial combustion in the chemist's laboratory, where we can command all our conditions, with the actual, natural processes of the living frame, *first assumed to be identical*. The argument might have been just as logically expressed thus :—

"Sawdust, burnt up in the laboratory, yields an amount of heat approximating to the measure yielded by Bread : therefore Sawdust will *actually* yield so many units of heat *in the blood* !"

In this form, however, the sophism is too transparent to deceive—in the other it is obscure, and *so* gives an excuse for tripping.

\* This means the *relation of heat to force* as determined by Mr Joule : viz., the heat resulting from the concussion of the fall of one kilogram (2½lbs avoird.) through 425 metres, which would raise one kilogram of water 1 degree C. in temperature.

† Ferrieh's *Handwörterbuch*, iii. Blondlot's *Traité de la Digestion*, p. 297. Simon's *Archiv.* i. Gmelin's *Verdauung nach Versuchen*, ii. Boussingault, in *Annal. de Chémie*, 3rd ser. xviii. Lehmann, iii. Of 50 grains of gum in mixture, 46 grains were found in the excrement, undigested. We know the old Traveller's tale of persons in the Sahara living *for days* on gum ; just as we know of the Indians, of Orinoco, living for weeks on *clay*. Neither case applies to the ordinary circumstances of man ; for if the gastric juice *does* partly dissolve gum when men are *starving* and it has nothing else to digest, experiments clearly prove that it will not do so when it has *anything better* to operate upon.

Science 'knows nothing of 'authorities,' except in the sense of witnesses to fact. Science is 'Facts methodized and generalized by Reason:' and 'reason' is a common faculty, whose decisions are of no private interpretation, but of universal authority. Private judgment can only justify itself by an appeal to this authority; it cannot *make* reasons or good reasoning; let us, therefore, carry this question to the Court of Fact, and let the imperial Reason give judgment on the case. To understand the laws and functions of Food, we must understand the human body which *wants* food; since all special wants spring from special natures. The Body, then, is a living, locomotive engine, for the generation of Power (or force) of three sorts—Chemical, Mechanical, and Nervous—with which three corresponding kinds of WORK are to be performed—Vital, Mechanical, and Mental.

As with an Engine we have, first, its *strength*, equal to so much 'horse power'—in other words, its mechanical capacity for strain and for the generation of steam; and, second, the *fuel* whence the steam power is to be derived (by the successive transformation of cohesion into heat, and heat into elastic force of vapour)—so, in the living Body, we have, first, its measure of capacity (including muscular power and organic endurance), second, its food-adaptation for repairing waste by nutrition, and for the generation of heat. From this point, Food appears to be requisite for *three* necessary ends, which are fulfilled by the supplementary agency of *Drink*, as the neutral vehicle of chemical, nutritive, sanitary, and vital changes.

I. FOOD *must nourish* (i. e. build up and repair) *the blood, and the organs and tissues formed out of it, by supplying the MATERIALS of which they are composed.*

But alcohol does not contain the constituent elements of the body; certainly not in any available form,—and cannot, therefore, build it up. It has no iron or salts for the blood; no gluten, phosphorus, or lime for the bones; and no albumen, a substance which is the basis of every living organism. And even if it had any of these elements, it is an established fact that the body *eliminates* alcohol from its precincts, whether introduced as beer, wine, or grog.\* The objector who says that "alcohol contains carbon, oxygen, and hydrogen, which are elements of the body, and therefore that it will supply the waste of those products," reveals his complete ignorance of the first principles of vital chemistry. Animals cannot feed upon gases, nor appropriate charcoal: *that* is the peculiar function of the vegetable, the appointed organism for preparing the food of man. Drink alcoholic liquor, and in a few moments it can be *smelt* in the breath, or collected from the skin. Since alcohol will not stick to

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\* It is true that only *one-third* of the alcohol absorbed in experiments has been actually re-collected from the breath, perspiration, and water of the body, by any apparatus yet devised; but, on the other hand, none of the known and immediate *derivatives* of alcohol—the substances into which it would turn, if decomposed at all such as *aldehyde* and *acetic-acid*,—have ever been detected. If no 'shells' are found it is unwarrantable to infer 'eggs.'

the living house, and is rapidly expelled from its organism, the belief that it can nourish is an utter delusion. It cannot, then fulfil the first end of food.

Baron LIEBIG says:—"Beer, wine, spirits, etc., furnish no element *capable* of entering into the composition of blood, muscular fibre, or any part which is the seat of the vital principle."

Prof. MOLESCHOTT, in his work on the Chemistry of Diet, says:—"Alcohol does *not* deserve the name of an alimentary principle." (Erlangen, 1853.)

Prof. LEHMANN, in his 'Physiological Chemistry,' says:—"We cannot believe that alcohol, theine, etc., belong to the class of substances *capable* of contributing towards the maintenance of the vital functions."

Dr E SMITH F.R.S., says:—"Alcohol is *not* a true Food. It interferes with alimentation" (1859).

Dr W. B. CARPENTER, in the fourth edition of his 'Manual of Physiology' (1865), says:—"Alcohol *cannot* supply anything which is essential to the due nutrition of the tissues" (p. 327).

II. FOOD *must* WARM the body, by being burnt up (i. e. oxidized through the agency of inspired oxygen), *either primarily as fuel, or secondarily as active, wasting tissue.*

Aliments are of two classes, (1) primary-Nutritive; and (2) simply-Respiratory. In plain English, one kind (albumen and its cognates) makes blood and builds up organs; another (oily and saccharine) is directly oxidized in the circulation, and thus yields heat by its decomposition. When nutritive matter, however, becomes flesh and nerve, and these, in the act of performing their vital functions, are worn-down and change into urea, carbonic acid, water, etc., heat is *also* given out as a secondary provision; though the main source of warmth is to be found in the hydrocarbons (fat and sugar), whose heat-force then stands correlated to the work to be done, or the evaporation sustained.

Now the French Chemists and Physiologists, Lallemand, Perrin, and Duroy, as well as Dr Smith and others, have amply demonstrated that Alcohol, when drunk moderately,\* is *not known* to undergo decomposition at all within the body, but *is known* to be constantly given-off by the breath, skin, and kidneys. The vital organism obviously treats alcohol as an intruder, and, irritated by its presence, is roused into an abnormal state of activity, until the last atoms of the offending article are cast out of the temple which it pollutes. The body *then* resumes its ordinary functions, subject to the reaction of wasted power.

Dr T. K. CHAMBERS, in his remarkable book, 'The Renewal of Life' (1862), says:—"It is clear that we must cease to regard alcohol *as in any sense* an aliment."

Dr MARKHAM, F.R.S., sums up a long discussion on Alcohol in 'The British Medical Journal,' as follows:—

"It is, to all intents, a foreign agent, which the body gets rid

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\* *Not* to 'intoxication,' as has been said; unless a *litre* of French wine will make a Frenchman drunk.



of as soon as it can. Alcohol is *not* a supporter of combustion. Part, probably the whole of it, escapes from the body; and none of it, so far as we know, is assimilated. It is, therefore, not a food in the eye of Science."

Dr W. B. CARPENTER justly says:—"The experience of Arctic voyagers is most decided in regard to the low value of alcohol, in comparison with fat, as a heat-producing material. The operation of alcohol is essentially that of a stimulus—*being followed by a corresponding depression of power*. Where exhilaration is produced, *there is subsequent depression*."

Baron LIEBIG says of the drinker, "SPIRITS, by their action on the nerves, enable him to make up deficient power *at the expense of his body*....He consumes his *capital* instead of his interest.... WINE is constantly followed by the *expenditure* of power."

Not only is 'the warming power of alcohol' a notion altogether unsustained by experience, yet clung to with a singular tenacity on negative grounds alone, it is distinctly opposed to the plainest facts. The process of combustion in the body is measured by the excretive products or derivatives of the food—carbonic-acid and water. Now alcohol greatly *lessens* carbonic-acid, as Drs PROUT and FYFE proved so long ago as 1819.

Dr VIERORDT, of Carlsruhe, says, as the result of experiment:—"The expiration of carbonic-acid, after the (moderate) use of *fermented liquors*, is considerably diminished, and does not return to its normal quantity for the space of two hours" (1845).

Professor LEHMANN says:—"We should forbid the use of spirituous drinks, and not prescribe tinctures, which might *hinder* the necessary excretion of carbonic-acid."

Dr E. SMITH says:—"The action of the *skin* is lessened. It neither warms nor sustains the body, (though) the *sensation* of warmth is increased." In other terms, alcohol burns the nerves, but casts a wet blanket over the vital fire.

III. FOOD, *by its double function* (as Nutriment and Fuel), *has for its final end the GENERATION OF POWER for useful and necessary Work—Organic and Voluntary*.

'WORK,' in fact, is the liberation, application, or transference of reserved-power to effect *motion* of some kind, and is necessarily attended by wear in the *apparatus* which works, and by change in the *materials* employed. As a matter of experiment, it is found that study (or other mental work) expends the forces and materials of the body (especially its highest parts, the nerves and brain) to the extent of one-third more than the hardest work in field, factory, or furnace. This explains why thoughtful men are rarely 'fat' or 'stout'; and shows how false is the popular standard of 'work,' which leads to the conclusion that "Teetotalism may do for *students*, but will not answer for *working men*"! A slight explanation of the laws of vital force will demonstrate the impossibility of deriving strength and force from the use of alcoholic liquors.

POWER must obviously be stored up in some available form, before it can be expended. In the human body, it exists as a concentration of cohesive, chemic, organic, and nervous forces, the sum of which expresses the actual *strength* or capacity of the constitution, for nutrition and excretion (health-power); for endurance and resistance of disease; and for voluntary work with the surplus. Now these and all other forces, as a little reflection will show, are correlated, and many of them are mutually convertible—i. e., as one form disappears, it *becomes* another of exactly the same value or quantity. So much concentrated sun-power passed into wood or coal in growing, holding-together its parts, when separated in burning *reappears* as light and heat; the excess of heat above the boiling point passes into steam-force, and that vanishes into mechanical action and attrition, etc., to become once more light, heat, and electricity. In like manner, the forces of the sun interweave themselves into the texture of the golden-grain, and become fixed as *cohesion* or chemical attraction; then bread made from that grain is digested into blood, part transformed into muscle, and part into oily and saccharine fuel in the circulation, and so is eventually decomposed in *the performance of the function* to which it was destined. Thus we return to our starting point, for all this merely explains how force is *liberated* after being temporarily *fixed*, or stored-up for use. The law is thus stated by the philosopher SPENCER, in his 'Principles of Biology':—"Whatever amount of power an organism expends in any shape [or we may add, possesses], is the *correlate* and *equivalent* of a power that was taken into it *from without*" (§63).

Dr G. BUDD, F.R.S., thus elaborates one aspect of the same truth, in his work on 'Functional Disorders':—

"Every kind of power an animal can generate, — the mechanical power of the muscles, the chemical (or digestive) power of the stomach, the intellectual power of the brain,—accumulates *through the nutrition of the organ* on which it depends" (1845).

From the very nature of things it will now be seen, how *impossible* it is that Alcohol can be strengthening food of either kind. Since it cannot become a *part* of the body, it cannot consequently contribute to its cohesive, organic strength, or fixed-power; and since it comes out of the body just as it went-in, it cannot by its decomposition generate *heat-force*. In stricter words still, while power is displayed in the shape of quiet COHESION, holding together the atoms of carbon, hydrogen, and oxygen in the peculiar form which alone constitutes Alcohol ( $C_4 H O_2$ ), it cannot *at the same time* be also exhibited as the MOTION called 'heat,' resulting from the dissolution of the elements previously cohering.

It is in the light of this explanation that we are to understand the following authoritative distinctions between that which

*stimulates* \* and that which *strengthens*—in fact, between the *spur* which irritates the tired nag, and the *corn* that feeds it.

Sir BENJAMIN BRODIE, F.R.S., after a long-life of experience, gives, in his 'Psychological Inquiries,' his final verdict thus: "Alcohol removes the uneasy *feeling* and the inability of exertion which the want of sleep occasions. But the relief is only temporary. Stimulants do not *create* nervous power; they merely enable you, as it were, *to use up* that which is left, and then they leave you more in need of rest than before" (i. p. 143).

Dr ARCHIBALD BILLING, M.A., in his 'Principles of Medicine,' (4th ed. 1841), thus enforces the same truth:—

"Tonics give strength, *stimulants call it forth*. Stimulants excite action, but action is not strength. On the contrary, over-action increases exhaustion. . . One thing necessary to the *recovery of the nervous system* (in fever) is *arterial blood*; to produce this of good quality digestion and free respiration are requisite. The digestion having been disturbed, it is useless to supply other than fluid nutriment (I have found *milk* the best), until some renewal of nervous energy takes place. *This restoration will not be expedited by stimulants.*"

BARON LIEBIG, so far back as 1843, in his 'Animal Chemistry,' pointed out the fallacy of alcohol generating power. He says:—"The circulation will appear accelerated *at the expense of the force available for voluntary motion*, but without the production of a greater amount of mechanical force." In his later 'Letters,' he again says:—"Wine is quite superfluous to man. . . it is constantly *followed by the expenditure of power*"—whereas the real function of food is to *give* power. He adds:—"These drinks promote the change of matter in the body, and are consequently *attended by an inward loss of power*, which ceases to be productive, because it is not employed in overcoming outward difficulties—i. e. in working."—In other words, this great Chemist asserts that alcohol abstracts the power of the system from doing useful work in the field or workshop, in order to cleanse the house from the defilement of alcohol itself.

Dr E. SMITH, in his experiments recorded in the Philosophical Transactions for 1859, proved the same thing of alcohol:—

"It greatly *lessens muscular tone and power*. There is *no* evidence that it increases nervous influence, whilst there is much evidence that it *lessens nervous power.*"

Professors LALLEMAND and PERRIN, a year later, state the same truth amongst their experimental conclusions:—

"*Muscular power is weakened*, and (in extreme cases) extinguished."

The late Dr W. BRINTON, Physician to St. Thomas's, in his great work on Dietetics, says:—

"Careful observation leaves little doubt that a moderate dose of beer or wine would in most cases, at *once diminish the maximum weight* which a healthy person could lift. *Mental acuteness, accuracy of perception, and delicacy of the senses, are all so far opposed by alcohol*, as that the *maximum efforts* of each are *incompatible* with the ingestion of any moderate quantity of fermented liquid. A single glass will often suffice to *take the edge off* both mind and body, and to reduce their capacity to something below their perfection of work" (p. 389. 1861).

\* This word signifies to *goad*. All poisonous and unnatural agents irritate living-parts—i.e. excite reaction—which is power put forth to expel an enemy, and not for the realization of the proper ends of power.



A little book\* contains a demonstration of the exhausting effect of alcohol in relation to voluntary work, which may be here usefully abridged. If the SUM of a Man's *available force* derived from Food be represented as 24 degrees, of which 17 degrees are needed for the healthy and vigorous working of the body itself,—there will be 7 degrees left for *voluntary work*, physical or mental. When alcohol is introduced, however, it evidently creates an *increased activity of the internal vascular system* (indicated by augmented pumping of the heart, and quickened pulsation and breathing). Now, unless this work can be done *without expenditure of power* (which is absurd), JUST SO MUCH FORCE (say 3) as this increased internal-work required for its possible existence, MUST HAVE BEEN ABSTRACTED FROM THE SURPLUS FUND destined for *voluntary Work*—the real end of the wonderful series of elaborate provisions revealed in nature—in other words, the Body is now *less-strong* by 3 degrees; and instead of having 7 units of energy available, has but 4.

IV. DRINK is needed as the VEHICLE of all vital movement. Adapted to this end, Providence has given us

“*Honest Water, too weak to be a sinner.*”

As Dr CARPENTER, in his ‘Manual’ impressively observes:—

“Water serves as the medium by which all alimentary material is introduced into the system; for until dissolved in the juices of the stomach, food cannot be truly received into the economy. It is water which holds the organizable materials of the blood either in solution or suspension; and thus serves to convey them through the minutest capillary pores into the substance of the solid tissues. It is water which, mingled in various proportions with the solid components of the various textures, gives to them the consistence they require. And it is water which takes up the products of their decay and conveys them, by a most complicated system of sewage, altogether out of the system....*No other liquid can supply its place*; and the deprivation of water is felt even more severely than the deprivation of food....Alcohol *cannot* answer any one of those important purposes for which the use of Water is required in the system; whilst, on the other hand, it *tends to antagonize many of those purposes* by its power of precipitating most of the organic compounds whose solution in water is essential to their appropriation by the living body.”

These facts, if not self-evident, are undeniable. Everywhere ‘water’ is hailed as a friend by the voices of vital Nature—at least in all ordinary measures. The flower in the garden, the grain in the field, the tree in the forest, unite with “the cattle upon a thousand hills,” in illustrating the *necessity* and the *bene-faction* of this simple and beautiful liquid—‘the water of Life.’ Its properties are marvellous and manifold: it cleanses, but never pollutes; it aids to nourish but never starves; it excites to normal action, but never irritates to fever and inflammation; and, in adapted quantity, *it is always retained until the function needing it is fulfilled*. Hence it wastes no force; makes no deduction from the sum total of organic power; but, on the contrary, aids the performance of all natural work.

From this may be seen the fallacy of the objection made by a certain Medical Advocate of Drink, viz.—that “BOTH water and alcohol are *equally* cast out of the system unchanged!” Even

\* An Inquiry into the Medical Prescription of Alcohol: by Dr F. R. Lees.

from this bare statement, what are the logical inferences? First, surely, that it is absurd to call either alcohol or water *food*; second, that to destroy genuine food wholesale, in order to generate an article so worthless and pernicious, is at least not less gratuitously wicked than for an invading general to burn down the growing-corn, or tear up the ripening vines. But after this evasion is objected to us, the *differences* between the natural element of Water, and the artificial Alcohol, still remain. Water fulfils useful, necessary, and blessed purposes in the vital economy, *and goes out of the body in the actual discharge of a beneficent sanitary mission*; while Alcohol really creates an internal commotion, defiles the vital stream, lowers and wastes the nervous forces, impairs the nutrition of the structures, and is finally *expelled* by the Police Force of the sanitary system.

V. If Experience, Science, and Reason all unite in distinctly rejecting the claim of Alcohol to be Food, there is a *consensus* of authorities testifying to the fact of its being POISON.

Professor CHRISTISON, M D., in his 'Treatise on Poisons,' ranks Alcohol, along with Nightshade, Nux Vomica, and Tobacco, in the class of double poisons—"Narcotico-Acid; being both *local irritants*, and producing an effect on the nervous system."

Dr CHARLES WILSON, in his admirable book, 'The Pathology of Drunkenness' (Edin. 1855), says:—

"No circumstances of ordinary life can render even the moderate use of intoxicating fluids either beneficial or necessary, *or even innocuous*."

Professor PEREIRA, in his 'Treatise on Food,' says:—"Ales are not fitted for ordinary use, *on account of their INTOXICATING and STUPEFYING qualities*."

Even Dr R. DRUITT, the great eulogiser of the Light Wines, is compelled to confess that "*Alcohol is a mere drug*; and although a constituent, is not *the valuable one*, in wine."

Dr H. R. MADDEN, thus expresses himself in an elaborate essay on 'Stimulating Drinks' (1847):—

"Alcohol is not the *natural stimulus* to any of our organs, and hence functions performed in consequence of its application, *tend to debilitate* the organ acted upon.

Alcohol is *incapable of being assimilated*, or converted into any organic proximate principle, and hence cannot be considered nutritious.

The strength experienced after the use of alcohol, is *not new strength added* to the system, but is manifested by calling into exercise the nervous energy pre-existing.

The *ultimate exhausting effects* of alcohol, owing to its stimulant properties, produce an *unnatural susceptibility to morbid action in all the organs*, and this, with the plethora superinduced, becomes a fertile source of disease.

A person who habitually exerts himself to such an extent as to require the daily use of stimulants to ward off exhaustion, may be compared to a *machine working under high pressure*. He will become *much more obnoxious to the causes of disease*, and will certainly *break down sooner* than he would have done under more favourable circumstances.

The more frequently alcohol is had recourse to for the purpose of overcoming feelings of debility, *the more it will be required*, and by constant repetition a *period is at length reached when it cannot be foregone*, unless re-action is simultaneously brought about by a temporary total change of the habits of life.

Owing to the above facts, I conclude that the DAILY USE OF STIMULANTS IS INDEFENSIBLE UNDER ANY KNOWN CIRCUMSTANCES."